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# F/A-18 FIRE PROTECTION SYSTEM

## *Keel Firewall Protection*

*Prepared For: FAA Tri-Annual Fire Protection Conference  
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# *Firewall Protection Brief*



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## *Background*

- Fire protection for aircraft has been based on a primary concept of fire containment, with supplemental provisions for fire extinguishing equipment on some aircraft.
- Firewalls continue to be the first line of defense to contain fires within designated fire zones and to prevent flames from spreading to otherwise unprotected compartments.



# *Firewall Protection Brief*



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## *Scope*

- Joint NAVAIR Fire Protection, Northrop Grumman and TA Mfg. test program was conducted to fire test various firewall/thermal shield panels and simulated components manufactured/assembled using the family of Fastblock® Sealant, Adhesive, coatings and Thermal Fire-Barrier Composite materials (TFBC).
- Materials are a newly developed silicone elastomer-based technology with exceptional tendency to transition to a durable ceramic char during exposure to fire.
- Fire test temperature and BTU requirements are considered to be severe and representative of in-flight fires in operational aircraft.
- No backside ignition requirement was taken from MIL-HDBK-221.



# Firewall Protection Brief

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## *Purpose*

- Test and evaluate new fire-barrier technology concepts and materials

## *Goal*

- Identify lighter, less costly firewall and heat shield materials technologies with improved performance that reduce installed and life cycle cost



# Firewall Protection Brief



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## *Fire Test Apparatus*

- Test apparatus was a test fixture utilized by NAVAIR Fire Protection to conduct fire testing.
- Meets the test condition requirements contained in AS 1055B and FAA AC-20-135.
- Test apparatus consisted of a “Park” oil burner, model DPL with an Inconel nozzle and an exhaust throat measuring 6 in. by 11 in.
- Burner is adjusted to produce a flame at  $2000 \pm 150$  °F,  $10 \pm 1$  BTU/ft sq., per second, over a minimum area of 50 sq. in., for 15 minutes.
- Burner is incorporated with a fixture stand to support test articles and provide adjustment for the height of the test article over the flame.
- Burner is located at the NAVAIR Aircraft Fire Protection Test Pad Facility, Patuxent River Naval Air Station, MD.



# Firewall Protection Brief



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## *How Is the Keel (Firewall) Constructed?*

- Firewall Is Designed to Contain a Fuel-Fed Fire From An Engine or APU Bay
  - **Designed To Withstand 2000 degree F Fire**
  - **Heat Flux of 10 Btu/ft<sup>2</sup>-sec**
  - **No Fire Penetration for 15 Minutes**
- Not Designed To Protect Against Ballistic-Type Threats
  - **Weight Penalty**
  - **Breach of Keel Immediately Compromises Firewall Integrity**
- Firewall Testing Conducted Recently at the Pax River Aircraft Fire Protection Test Pad Facility
  - **Unprotected Firewall Section Tested**
  - **Various Fastblock Sealant Compounds Evaluated**

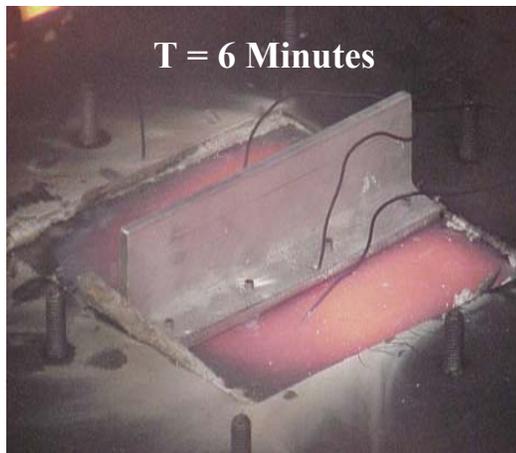
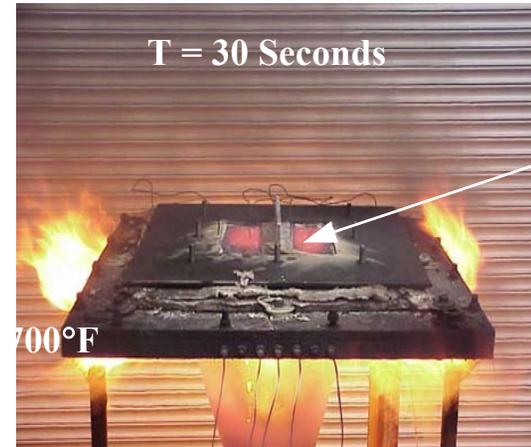
# Firewall Protection Brief

## *Firewall Testing*



# Firewall Protection Brief

## Firewall Testing – Ti Panel Only



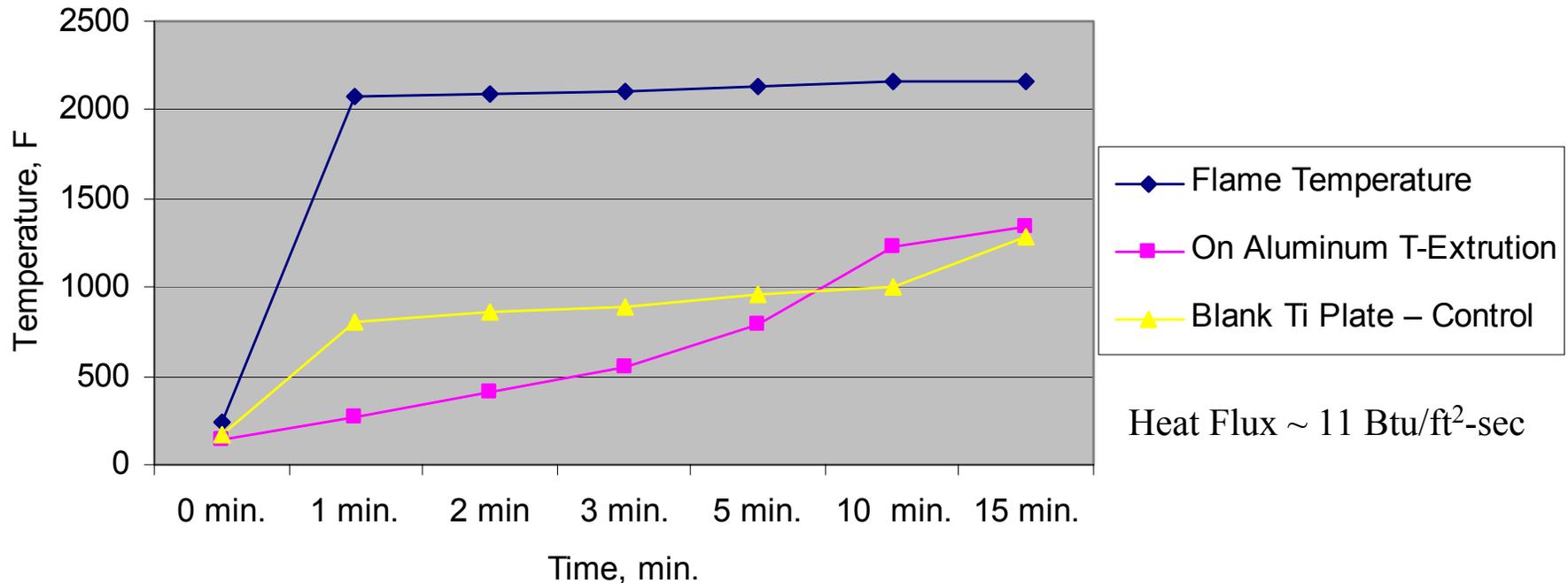


# Firewall Protection Brief



## Firewall Testing - Ti Panel Only

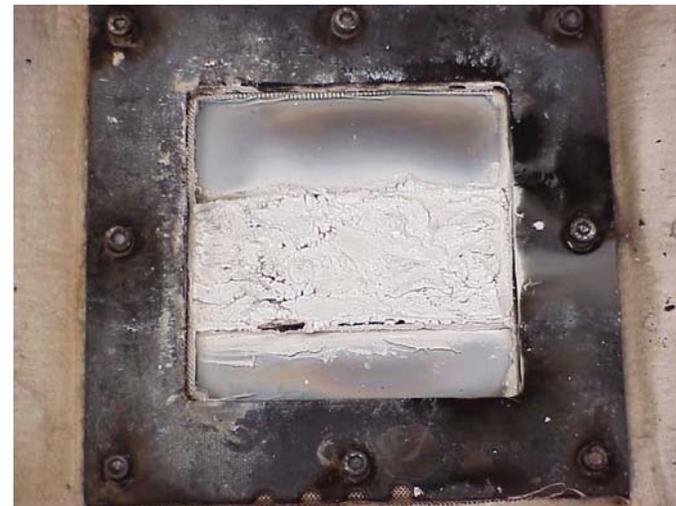
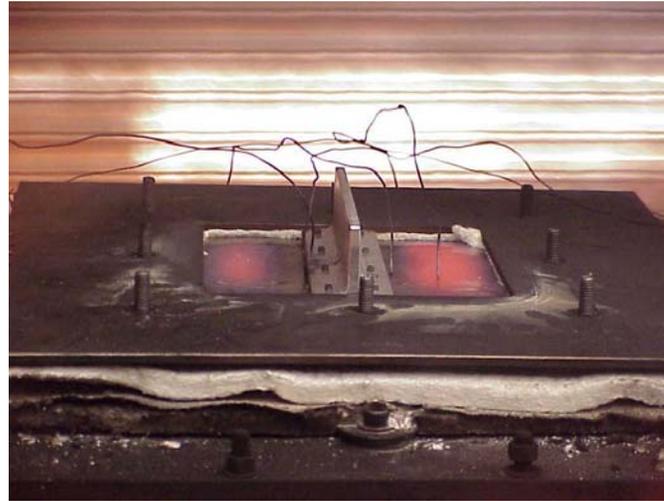
Back Side Temperature Profile



Breeden, Tom, "F/A-18E/F, Test Report Of Fire Testing Conducted In Support Of Non Contractual Technical Authority Project, Titanium firewall Replacement with New Technology Materials," Northrop Report No. NOR 00-303, 15 January 2001

# Firewall Protection Brief

## *Firewall Testing – Ti Panel w/ Fastblock™*



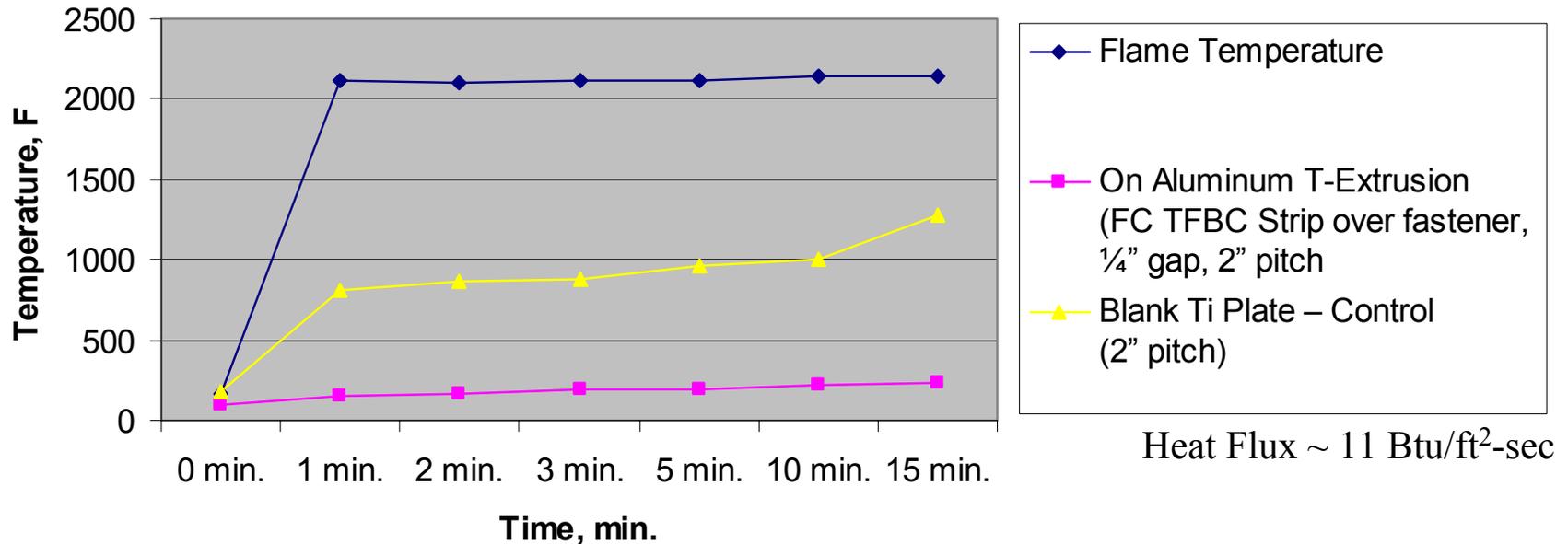


# Firewall Protection Brief



## Firewall Testing - Ti Panel w/ Fastblock™

### Back Side Temperature Profile



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# Firewall Protection Brief

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## *Summary*

- Test and Evaluated Several Fastblock™ Compounds
- Verified No Backside Ignition After 15 Minutes
- Significantly Lower Backside Temperatures Are Below Annealing Temperature of Aluminum
- Fastblock™ Approved For Use As Firewall Sealant on F/A-18E/F Aircraft
  - NSN Assigned